## HISTORICAL IMPACTS FROM HUMAN ACTIVITIES (1800-2001)

Two subcontractors were hired to complete historical research to obtain information on how and where wetlands and riparian areas have been altered or lost due to human activities in the Gallatin Valley. This historical research focused on changes since human settlement in the area started around 1840. Valerie Harms conducted oral history interviews and literature research to collect information on the historical presence of wetlands, and the human activities that have impacted them. Curtis Kruer analyzed old aerial photography and used other existing spatial data to map the maximum historical extent of wetland and riparian areas in the Gallatin Valley. Combined, these two efforts shed light on how and where human activities in the Gallatin Valley have impacted wetland and riparian areas.

### Oral History Interviews as Insight

Interviews conducted by Valerie Harms provided insight into some of the common human activities that have resulted in changes to wetland and riparian areas. Oral interviews were provided by Dean Adams, Dan Langohr, Marcia Youngman, Dave Wessell, and Kate Moore. The following summaries are provided from those interviews.

***Mr. Dean Adams***-Dean Adams lives in Bridger Canyon on the East side of the Bridger Mountains. This area is outside the project area, but the information provided gives good examples of human impacts to wetlands. It was reported that in the late 1800's the previous owner of the property plowed up beaver ponds and wetlands on the property to make pasture. He also noted that several property owners in the area have attempted to straighten Bridger Creek to make it easier to hay.

***Mr. Dan Langhor***- Dan Langor's family operated the Langhor Greenhouse along Bozeman Creek for many years. A spring creek ran behind the property. His family constructed a pond using the creek in the 1930s to provide irrigation water for plants grown outside the greenhouse. The construction of the pond altered flow patterns and resulted in the formation of some small wetland features. He noted that in the 1970s this land was purchased and apartments were built. The pond was closed due to some accidents that occurred.

***Ms. Marcia Youngman***-Marcia Youngman has lived in the Bozeman area for many years and is a former Mayor of the City of Bozeman and an active City Council member. She provided perspective on the challenges the City of Bozeman has faced dealing with wetlands and floodplain issues. She stated that much of the land area now occupied by the City of Bozeman was reported to be either wetland or riparian habitat. Some of this habitat resulted from the presence of numerous beaver ponds. It was also noted that a road built north of Durston near Harvest Creek subdivision created an unintended artificial wetland, and that Bozeman Creek had been straightened in the Sundance Springs development.

***Mr. Dave Wessell***- Mr. Wessel also lives along Bozeman Creek (Sourdough Creek), south of Bozeman. He remembered the "swamp/lake" at Langhor's and played there when he was a child. He noted impacts to wetland and riparian features north of the City of Bozeman when Interstate (I-90) was built. He also stated that wide spread suburban development is having a negative impact on wetlands.

***Ms. Kate Moore***- Ms. Moore is a Bozeman native that lives on 100 acres near Nash Creek and Bozeman Creek, south of Bozeman. She noted that many of the springs in the area have dried up. Several man-made ponds have been built in the area, which may be impacting the streams and springs.

**The Pattern of Human Activity**

In addition to the oral history interviews, Valerie Harms researched library documents, old newspaper articles, museum documents, and discussed wetlands and riparian areas with local resource managers. Combined with the oral interviews, a general pattern of human activities in the Gallatin Valley that have impacted wetland and riparian areas emerged. In general chronological order from earliest activities to current activities the following activities appear to be the most significant:

1. Trapping of beaver and significant reductions in beaver populations.
2. Agricultural development
3. Construction of transportation corridors (roads and railroads)
4. Urban development
5. Suburban development and associated decline in agricultural land uses

**Declining Beaver Populations**

The historical influence of beaver on the spatial distribution of wetlands and riparian areas is incalculable, but probably significant. Large numbers of beaver would have resulted in the creation of numerous ponds, alteration of stream cannels, and significantly greater backwater areas than are present today. Documentation of extensive beaver populations in the Gallatin Valley extends back to the time of the Lewis and Clark expedition. On the return trip in 1806 Captain Clark recorded the following journal entry while crossing the Gallatin River: *" Struck the river (Gallitines) and crossed several chanels of the river running through the bottom in defferent directions. I proceeded on about two miles crossing those defferent chanels all of which was damed with beaver in such a manner as to render the passage impractical."* Mr. Greg Munther, former USFS District Ranger for the Gallatin National Forest, stated that before 1800 beaver influenced most streams and rivers in the area. As previously mentioned, Dean Adams stated that the former owner of his land on Bridger Creek plowed up a beaver pond. Overall the impact of significantly reducing beaver populations in the project area by trapping is considered to be the first human activity that resulted in decreases in wetland and riparian habitat in the Gallatin Valley.

**Agricultural Development**

Most of the early settlement in the Gallatin Valley was associated with agriculture. Farming and ranching have both been important economic activities and remain so today. As seen on the CIR imagery shown on Attachment C, a significant percentage of the land usage in the Gallatin Valley is still agricultural. On Attachment A crop lands show up as bright-red geometric shapes if they were still being irrigated when the photographs were taken, or as white to dark brown geometric shapes if they were already harvested or in fallow. Pasture lands are harder to spot on the CIR imagery, but often show up as areas with grey tones if the pastures are not irrigated, or as mottled shades of pink and red if sub irrigated or irrigated. The earliest documented agricultural activity dates back to the 1860s. Crops were being grown in the Reese Creek area in 1846 (Bates, 1994). Historical aerial photographs show that by 1937 much of the land in the Gallatin Valley was being used for ranching or farming.

By 1953 over 111,000 acres were being irrigated within the Gallatin River basin, with most of this irrigation occurring within the Gallatin Valley (Montana State Engineer's Office, 1953). The earliest documented irrigation ditches were the Penwell and Babcock ditches constructed in 1964 to divert water from the East Gallatin River. The Flannery ditch was constructed in 1868 to divert water from the East Gallatin River. Construction of ditches to divert water from the West Gallatin River began at about the same time with construction of the Heeb ditch (1865), Mammoth ditch (1866), Lewis Ditch (1870), and numerous others. Most of the other ditches were constructed between 1880 and 1900. These ditches include several large projects such as the Warm Springs Canal (1889), High Line Canal (1890) and the Low Line Canal (1899-1901). These canals had a collective length of over 90 miles (Montana State Engineer's Office, 1953).

Agricultural activities have had both positive and negative impacts on wetland and riparian features in the Gallatin Valley. Overall the impact has been to reduce the areas covered by both wetland and riparian areas. In many places wetlands have been drained to improve the land for farming. Many sub-irrigated areas that were probably historical functioning wet meadows are grazed during the dryer times of the year. A common impact has been the clearing of riparian vegetation to allow for better grazing, and hay production. Construction of the existing network of irrigation ditches and canals resulted in the creation of significant linear riparian and wetland features. These features were well documented by the NWI discussed earlier. Some isolated sloping wetlands have been created where irrigation water leaks or seeps from ditches on higher ground, or discharges in low areas below irrigated fields. Figure 13 shows an example of riparian features developed in drainages as a result of runoff from irrigated fields. Figure 14 shows examples of areas where wetlands have been drained, and where riparian vegetation has been cleared for agricultural purposes.

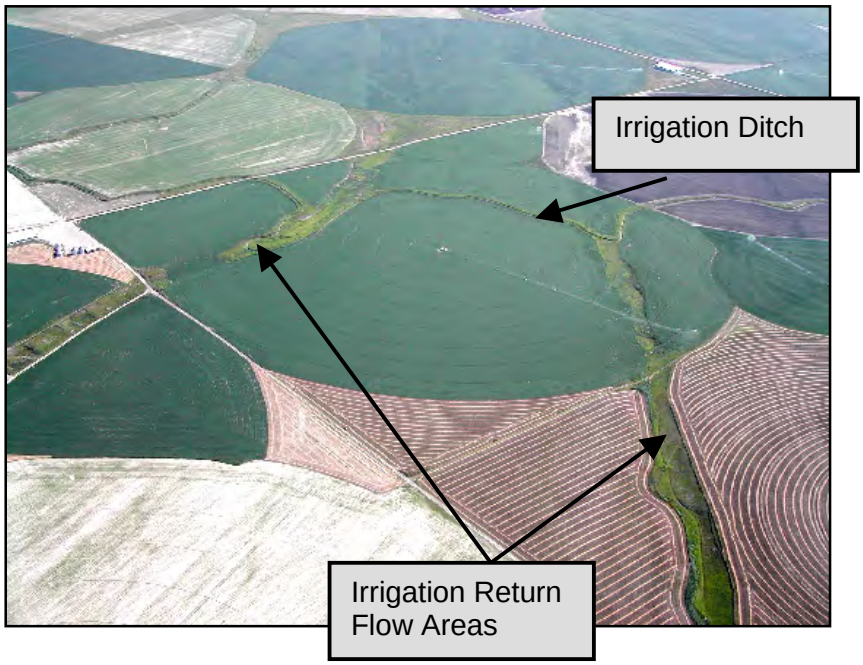


**Figure 13**. Riparian features created by runoff from irrigated fields

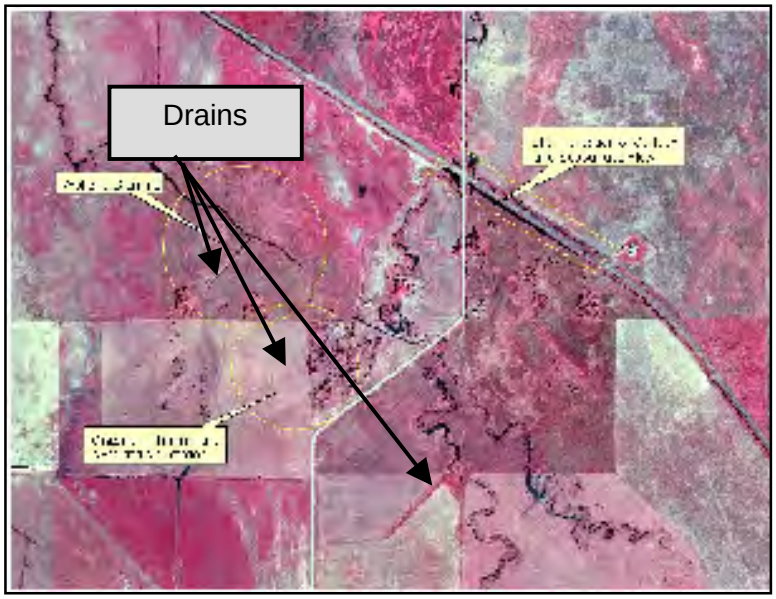


**Figure 14.** Examples of impacts to wetlands and riparian areas from human activity.

**Construction of transportation corridors**

Construction of roads and railroads has also had a significant impact on both wetland and riparian areas. The Interstate-90 corridor, which includes a railroad, frontage road, and utility lines, cuts across the Gallatin Valley from southeast to northwest (see Attachment C). This transportation corridor cuts across the regional surface water and ground water flow patterns, which are generally from south to north. In many cases road/railroad beds altered surface water flow patterns by damming surface water on the uphill side and reducing surface and subsurface flow on the downhill side. An example of this impact is shown on Figure 14, where an old railroad bed has altered flow patterns. Figure 15 shows another example of a wetland area created by alteration of surface and shallow subsurface flow. The area downslope of the roadbed is now being used for agriculture, but was probably much wetter prior to construction of the roadbed. The site is shown as seen on the CIR imagery and from low altitude in natural color.

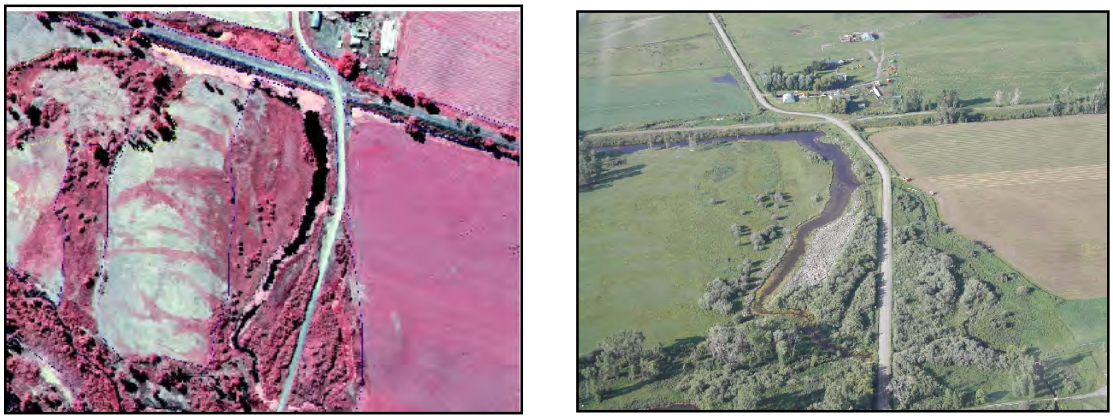

**Figure 15.** Example of wetland created/altered by construction of roadbed, as seen on the CIR imagery and from low altitude in natural color

**Urban development**
The first documented settlement was established in 1862 and was known as Gallatin City (State Engineer's Office, 1953). Gallatin City was located at the mouth of the Gallatin River and was also referred to as East Gallatin. Bozeman was established in about 1864, followed by Belgrade in 1883, and Manhattan in 1884. Urban development has generally resulted in a decrease in wetland and riparian habitat due to the intensive land use changes within the urban areas. Urban development associated with the growth of Bozeman appears to have had the largest impact. Much of the land area now occupied by the City of Bozeman may have been covered by wetlands and riparian areas. The NRCS soils data maps most of the area as urban, so no information was found to verify the presence of hydric soils in the area. Bozeman Creek has been significantly altered by this urban development, and flows underground through the present downtown area.

Construction along the northwest, north, and south margins of the present urban area often require pumping of shallow ground water to dewater the area prior to building foundations. Recent commercial development along the north 19th Street area (northwestern margin of the City of Bozeman) has resulted in the alteration of both wetland and riparian habitat. Figure 16 shows a small, altered wetland associated with urban commercial development.

**Figure 16.** Modified wetland associated with commercial development in Bozeman

Urban development associated with the growth of Belgrade, which is currently one of the fastest growing cities in Montana, does not appear to have had much of an impact on riparian and wetland features. The Belgrade area is generally underlain by coarse gravels, is located away from major rivers and streams, and has depths to ground water in excess of 20 feet. This area appears to have always been relatively dry and well drained.

**Suburban Development**
Suburban development has increased significantly over the last 20 years in the Gallatin Valley. As previously stated (page 1), since the 1980's about 80% of the wetland loses nationwide are due to non-agricultural development, much of that is associated with suburban development (Brown & Lant, 1999). Suburban growth has had widespread impacts on wetlands and riparian areas. In previously undeveloped areas suburban development has

displaced or altered wetland and riparian habitat. Suburban development in areas that were previously being irrigated, may also be resulting in declining ground water levels locally due to loss of artificial ground-water recharge from the irrigation. The declining ground water levels can result in drying of wetland and riparian features in low lying areas that have relied on the excess irrigation water. Analysis of the potential impacts from land use changes from irrigated agriculture to suburban development were beyond the scope of this project. Figure 17 shows an example of the displacement of wetland and riparian habitat by suburban development north of Bozeman as seen on the CIR imagery and from low altitude in natural color. Much of this area is underlain by hydric soils, which suggest that wetland and riparian features were historically more extensive.

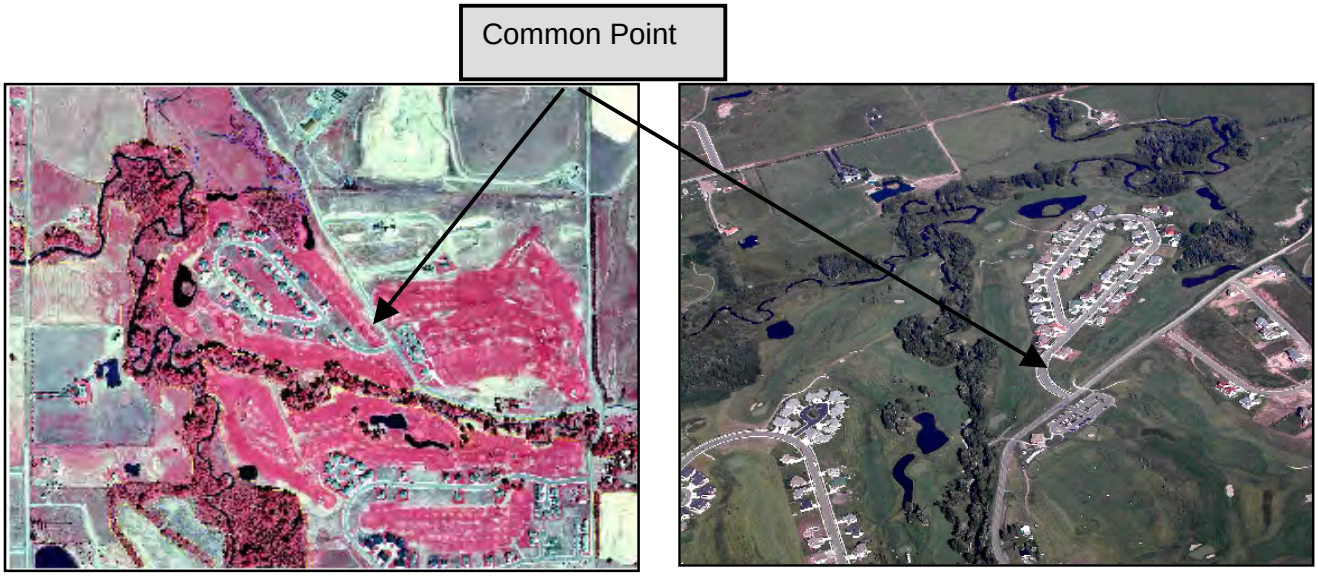


**Figure 17.** Example of impacts to wetland and riparian areas from suburban development